

ARCADE RESURRECTION

Originally sold as a pure TV game accessory beginning in November, 1977, the Bally Arcade was upgraded to computer status by the introduction of a Basic cartridge in August, 1978. This ROM cartridge contained a version of Dr. Wang's Palo Alto Tiny Basic, restructured to utilize the onboard Z80 CPU and to accommodate three custom IC's that were included in the original unit to provide arcade color and sound features. An upgrade was promised that would provide a full-size Keyboard, additional memory, and a new language called Z-GRASS. The author started to publish the ARCADIAN Newsletter when the Basic cartridge appeared, to support users with documentation and software since the factory was loathe to part with any data. By disassembling the Basic cartridge and on-board ROM, many interesting features were discovered and were published in the Newsletter for use of the subscribers.

..Here was an Integer Basic that could manipulate decimal numbers with up to seven digits either side of the decimal point.

..Normally capable of placing any two of 256 colors on the screen, manipulation allowed four colors.

..PEEK and POKE commands allowed rapid speed machine code programs.

..CALLs could be made to on-board routines.

..Each of the three voices of the music generators are accessible allowing melody and counterpoint.

While a limiting characteristic of the Basic is that it will not access any more than 1.8K of RAM, considerable cleverness has been exhibited by users to create useful and provocative programs.

Third Party Support

Bally kept extending the expected availability date for their upgrade system, blaming delays on the FCC, or chip manufacturer, etc., but

after over a year of waffling by Bally, the ARCADIAN publisher decided it was time to "do it ourselves". A contract was about to be let for the creation of a keyboard/memory addition when it was announced that Fidelity Electronics was interested in purchasing the Bally Consumer Products Div. The addition was put on the shelf since it was not feasible to compete with the factory - but after another ^{six} months of negotiations, that deal fell through. The approach then taken by the ARCADIAN was the creation of small additions which would allow the user to have some additional capacity at a relatively low cost, and he could incrementally expand his unit as his desires and/or pocket book would allow. As a result, these sources are providing the following systems:

1. Perkins Engineering: The BLUE RAM - A cornerstone device containing 4.2K of static RAM and two 8-bit parallel I/O ports. Storage of any of the following is possible, or some combination thereof: 2100 string entries of two bytes each; 4000 bytes of machine code programming; 3800 bytes of Basic programming, using the Blue RAM Operating System. This device mounts directly to the 50-pin connector at the rear of the Arcade's motherboard (accessible from the outside). Inasmuch as it has its own power supply, it can retain its program while the Arcade unit is shut down. Memory is write-protected by software or a convenient switch. A number of utility programs have been written to expand its usefulness, some having to do with added accessories which utilize the I/O ports provided via the included Zero Insertion Force socket.

A. A 62-key full service keyboard can be attached to one of the I/O ports to augment the Arcade's keypad.

B. An Operating System provides editing and parameter passing.

C. A BSR controller emits an ultrasonic signal to activate the BSR remote control system under Arcade program control, providing 16 117v outlets with on/off or dimming commands at 10 minute intervals in a 24-hour program.

D. A MODEM accessory allows attachment of a Livermore STAR for telephone communication as well as a BASE 2 printer.

2. Perkins Engineering: A modified Arcade motherboard is under development that allows HI RES and MED RES programming. In these modes, the screen has 204 x 160 (like Intellivision), or 204 x 320 pixel format for the finest detail of any low priced system. This system increases the IC count of the Arcade from 34 to 73, and requires a larger transformer.

3. Alternative Engineering Corp.: VIPER SYSTEMS

VIPER SYSTEMS are available in three basic configurations, with a choice of 1, 5, or 10 plug-in module capabilities. Plug-in circuit modules are interchangeable, allowing easy system upgrading. All VIPER SYSTEMS are supported by the new 8K Extended Basic 1.0 which is included on tape. (see Item 4. below.)

The VIPER SYSTEM 1 is a stand-alone 16K byte RAM memory expansion, utilizing the same plug-in RAM module as the SYSTEMS 5 and 10. This module allows 4, 8 or 16K bank boundary selection and features 8K or 16K Write Protect. Other features of the SYSTEM 1 include an ASCII keyboard input port, heavy duty power supply, and switched AC outlet.

The VIPER SYSTEM 5 is built around an 8 port I/O module, leaving 4 slots for RAM or other plug-in optional system monitor, 2400 baud cassette tape interface with dual machine control, 5 watt audio amplifier, 300 baud printer output port, and extended addressing.

The SYSTEM 5 also includes an ASCII keyboard input port and switched AC outlet.

The VIPER SYSTEM 10 is a 5-slot expansion cabinet for the SYSTEM 5 allowing memory expansion up to 128K bytes.

Both the VIPER SYSTEMS 5 and 10 incorporate an aluminum card rack with nylon guides, fan mount, and 5-slot motherboard.

The VIPER SYSTEM keyboard is a 62 key ASCII encoded unit with a 10 foot coiled interconnect cable for remote operation. It features upper and lower case, control characters for Extended Basic command words, and a code function for alternate character sets.

4. Consortium: EXTENDED BALLY BASIC is an 8K version of the 4K original that is compatible with the basic Arcade machine and both memory additions described above. It is available in a cartridge (EPROM), for use in the Arcade or in conjunction with the BLUE RAM device; or on a tape, for use with the VIPER or a home-brew memory addition. By doubling the size of the language, more enhancements are available, and certain limitations required by the original are removed, especially that of memory addressing. As a result, Extended Basic provides greater capacity and graphic versatility. Some of the features it contains include: smaller 3 x 5 characters as well as the original 5 x 7 font; POINT and CIRCLE commands added to the original BOX and LINE, SCROLL (forward or backward); SNAP, which stores any selected portion of the screen in memory for later reappearance, at any other screen location, using SHOW; four colors on the screen from the 256 choices; plus user-defined limits of text and graphic areas on the screen.

5. Anderson Research and Design: THE COMPUTER EAR is a speech recognition device consisting of a microphone and electronics that will convert speech inputs to suitable signals for entry through a hand controller port, using an optical coupler. Once digitized and stored into the Arcade memory, the signal waits for another oral input, for comparison and matching. Software is provided to allow access into a Basic program once a match is made.

6. Richard Houser, publisher - SOFTWARE AND HARDWARE SOURCEBOOK is a catalog/listing of over 300 items dealing with the Arcade. It acts as a complete index of all programs printed with a brief description of each, and includes a list of all known hardware available for purchase.

Rebirth

Meanwhile, Bally did succeed in selling its Consumer Products Division to AstroVision, Inc., a Columbus-based company that controls E. F. Johnson, the CB manufacturer. Johnson had been constructing the Bally motherboard for some time under subcontract.

AstroVision has promised to continue sale of the Arcade, expand the number of game cartridges available, and produce the long-awaited memory addition. So far, the promises have started to come true...

- o The Arcade game package itself is in production. The motherboard has been revised by a change to the parts layout to avoid heat concentrations that plagued the Bally system.

- o The Tiny Basic cartridge has been revised to be more useful to the neophyte, primarily by the addition of TRACE and EDIT functions. A second string array, scroll control, clarification of sound and noise generation commands, and incorporation within memory of locations where hardware can be added are other features that have been included. This cartridge also includes a 2000 baud cassette interface which

loads at better than six times the old rate, and additionally loads the screen image, the values stored in both arrays, and the values of all variables onto the tape.

- o The marketing scheme will combine the Arcade machine and the new Tiny Basic cartridge into a single package, identified as the ARCADE "PLUS". All purchasers will therefore receive a free Basic cartridge with their game machine and be receptive to computer operations.

- o New games are in various stages of work. Fifteen are slated for production this year. These include: Galactic Invaders, Biorythm, Space Fortress, and Music.

- o The memory/keyboard addition is slated for this Fall. A preliminary batch of hand-wired units were sent out for field testing over a 60-day period.

Critiques and inputs were fed back to AstroVision for their consideration. This addition, dubbed the "ADD-UNDER", will contain an additional 32K of RAM and 24K of ROM, plus a keyboard. The screen will be configured at 160 x 102 pixels, and will have four color capability (out of a pallet of 256). Other features are: connector for disc storage of data; connection to audio amplifier input; dual cassette control; multi-dimensional arrays; interpreted and compiled modes; and an extended math package; to name a few. The biggest advantage this addition will have over any of the other commercial units is the inclusion of Dr. Tom DeFanti's ZGRASS language. This highly graphically oriented system allows the user to produce displays of great versatility. Adding the commands of POINT and ELLIPSE to the existing LINE and BOX enables the programmer to create

virtually any shape on the screen. Using SNAP to store the picture in an array, he can then reproduce it at will anywhere on the screen, any number of times, using SHOW. The language supports the use of a "Macro", which is a subroutine that can run concurrently with one or more other subroutines. This operation is called "Multitasking", and the ZGRASS will handle up to 127 macros at once. Animation is possible by placing images in macros and SHOWing them in sequence using the multitask technique. As a method of training, the ZGRASS contains a library of instructions called up by the command HELP which provides a list of commands and their required formats. ZGRASS has been in use in Dr. DeFanti's classes at the University of Illinois for some time now, and recently has been available in the UV-1 computer marketed by Datamax. The AstroVision product differs primarily in not having the high resolution screen of the UV-1.

Personal Growth

As a direct result of the very existence of the ARCADIAN, a number of subscribers have found new or additional job opportunities. There is the obvious development of hardware/software to fill the needs of others for games, utilities, etc., which sets up a small group of individual entrepreneurs.

There is, however, another group of subscribers who have received job offers to devote full - or part-time activity to the development of Arcade-oriented projects. The efforts these people have successfully made to keep interest in the Arcade device from deteriorating during the interim between introduction of the Bally Basic in 1978 and the fulfillment of the Add-On promise, by AstroVision, by virtue of their activity and support of the ARCADIAN has resulted in their recognition in the job market.

The ARCADIAN's role as forum, test bed, stimulator, and possibly guide, is perhaps unique in this field.